

III. "Memoir on the Symmetric Functions of the Roots of certain Systems of two Equations." By ARTHUR CAYLEY, Esq., F.R.S. Received December 18, 1856.

(Abstract.)

The author defines the term *roots* as applied to a system of $n-1$ equations $\phi=0$, $\psi=0$, &c., where ϕ , ψ , &c., are quantities (*i. e.* rational and integral homogeneous functions) of the n variables ($x, y, z, \dots$) and the terms *symmetric functions* and *fundamental symmetric functions* of the roots of such a system; and he explains the process given in Professor Schläfle's memoir, "Ueber die Resultante eines Systemes mehrerer algebraischer Gleichungen," Vienna Transactions, t. iv. (1852), whereby the determination of the symmetric functions of any system of $(n-1)$ equations, and of the resultant of any system of n equations is made to depend upon the very simple question of the determination of the resultant of a system of n equations, all of them, except one, being linear. The object of the memoir is then stated to be the application of the process to two particular cases, viz. to obtaining the expressions for the simplest symmetric functions, after the fundamental ones of the following systems of two ternary equations, viz. first, a linear equation and a quadratic equation; and secondly, a linear equation and a cubic equation; and the author accordingly obtains expressions, as regards the first system, for the fundamental symmetric functions or symmetric functions of the first degree in respect to each set of roots, and for the symmetric functions of the second and third degrees respectively, and as regards the second system, for the fundamental symmetric functions or symmetric functions of the first degree, and for the symmetric functions of the second degree in respect to each set of roots.

IV. "Memoir on the Resultant of a System of two Equations." By ARTHUR CAYLEY, Esq., F.R.S. Received December 18, 1856.

(Abstract.)

The resultant of two equations such as

$$\begin{aligned} (a, b, \dots, x, y)^m &= 0 \\ (p, q, \dots, x, y)^n &= 0 \end{aligned}$$